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Antiferromagnetism in hydrated 123 compounds

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Abstract

Copper nuclear quadrupole resonance and zero-field nuclear magnetic resonance (ZFNMR) studies of YBa2Cu3O6.5 show that a magnetic phase appears in underdoped 123 superconductors treated in ambient moist air. The studies give convincing evidence that the "empty" CuO chains play the role of easy water insertion channels. The reaction occurs first in ordered regions of the crystallites. The final product of the reaction is a nonsuperconducting antiferromagnetic compound characterized by at least two types of magnetically ordered copper ions, with ZFNMR spectra in the frequency ranges 46-96 and 96-135 MHz, respectively. Even for powder samples fixed in an epoxy resin, this reaction is found to have partially occurred after a few years.